British Central Africa is drained (*a*) by the Nyasa-Shire-Zambezi outlet, (*b*) the Loangwa-Zambezi, (*c*) the Luapula-Congo. That portion of the Nyasa-Tanganyika plateau which borders on the route of the "Stevenson road" drains in five directions: (1) To Lake Tanganyika and the Congo, (2) to Nyasa, (3) to the Chozi and Luapula, (4) to Lake Rukwa, which has no outlet, (5) to the Loangwa and Zambezi.

But while the bulk of this portion of Africa lies at elevations over 3000 feet, the two main drains to the south, Nyasa-Shire and Loangwa-Zambezi, form deep depressions of considerable width, not attaining an altitude of anything above 1500 feet in their northernmost (highest) parts. One result of this is that British Central Africa has two climates, that of the low country, hot and somewhat unhealthy, and that of the uplands, pleasant and fairly healthy.

When I first knew Nyasaland, in 1887, there was an available line of water transport some 700 miles in length from the Zambezi mouth to the north end of Lake Nyasa, with one break only, the Murchison cataracts of the Shire River (which extend for some 40 miles). During recent times the course of the Shire has so rapidly and persistently silted up, both above and below the cataracts, that at the present day the upper portion is almost unnavigable at any season, and the lower river, instead of being available as a transport route all the year round from the sea to the foothills of the Shire Highlands, can only be used for a few months of the year so far as the junction with the Ruo River. The Shire gathers very little water on its course, and is the overflow pipe from the Nyasa tank. When that tank almost ceases to overflow, as is the case at present, the pipe *must* be more or less empty, and no human power can fill it.

This enforced abandonment to a great extent of the Shire as a transport route has been a terrible handicap on the growing planting industries of Nyasaland, which at this moment is unable to find a means of transporting to the sea-coast the cotton, tobacco, rice, maize, tea, rubber, and other marketable articles she is actually producing. The suggested extensions of the railway north and south will enable the protectorate not only to deal with what she is now producing, but to open up large additional tracts of land.

For the present fall in level of Lake Nyasa, the result of which is a far scantier and only intermittent overflow into the Shire River, it is difficult to assign any reasonable cause except a decreased rainfall in the basin; but such observations and records as have been kept at lake stations during the last few years do not seem altogether to bear out this supposition. A theory which might to some extent account for definite cycles of rise and fall of the level of Nyasa (presumably due to lessening and increasing rainfall) has suggested itself to me, and I advance it for what it is worth. We are aware that Tanganyika has a natural outlet to the Congo. When Livingstone and Stanley were there this outlet was found (the Lukugu), but it was blocked up; it was clear from native evidence that the lake had been rising in level for a number of years. The prophecy was then made that sooner or later it would break out at its old outlet. This subsequently took place, and for years Tanganyika has sent its surplus waters to the Atlantic. I am not aware whether the Lukugu has yet closed again. A noticeable feature on Nyasa is an old beach-mark, 6 or 8 feet above the highest level to which the lake now rises. This mark is distinct and clear, especially on the rocks, and is carried round the lake both in the open and in the most secluded and sheltered bays. It is abundantly evident that at some not very distant time the lake had this higher level, from which there must have been a *sudden* fall. Some few years ago, during the dry season, Nyasa ceased to overflow, and the bed of the Shire River at its exit began to silt up, reeds and other plants took root, and natives were able to walk across with only a few inches of water here and there. It would only have needed a few similar seasons for the outlet to have become entirely choked up, as was the case with the Lukugu. Is it not probable, therefore, that this has actually taken place at previous periods, and that the level of the lake subsequently rose until it overflowed the barrier and finally burst it? Is it not, moreover, probable that these cycles of fall, blocking up, rise, and outburst have been going on for ages? A sort of recurring decimal.

The Nyasaland basin is very limited in extent. The bulk of the water which enters the lake comes in at its northern end from high country lying beyond the Anglo-German boundary. Part of this country consists of a very interesting volcanic district in "Kondeland," which is dotted over with the craters of extinct volcanoes. On the east side of Nyasa the watershed between the lake and the Indian Ocean lies within a few miles. No rivers of any size enter the lake from the east.

To refer to the climate of British Central Africa. Throughout the higher levels, from May to September inclusive, it would be hard to find a pleasanter climate. October and November are hot, but dry; December to March constitutes the rainy season; April is cool and finer (the finishing of the rains). Malaria is, of course, the chief trouble. If this could be checked there is no reason why the elevated plateaux, not only of British Central Africa, but of many other parts of tropical Africa, should not be as healthy as Queensland. Knowledge which has been gained during the last ten years, largely through the exertions of the London and Liverpool Tropical Schools of Medicine, has enabled us not only to get a very much better insight into the causes of malarial fevers, but also to some extent to prevent their occurrence. Most tropical diseases are now known to be communicated by various biting insects, and if it were possible to protect ourselves against the attacks of these we should be able to prevent fevers. The difficulty, however, is to carry this out successfully.

A few years ago the first cases of sleeping sickness were discovered in British Central Africa. The disease reached this part of the continent from the Congo State, having, no doubt, been carried to the shores of Tanganyika and Mweru, and to the Luapula Valley, by the numerous expeditions from the Congo to the eastern boundaries of the Free State. It quickly established itself on Tanganyika and Mweru and in the Luapula Valley, also along the banks of several of the larger rivers running into Mweru and Tanganyika. Quite recently cases have appeared in the valley of the Luangwa, and also in the country bordering on the south-western shores of Lake Nyasa; and it is evident that there is in this part of Africa some hitherto unknown agent which carries the germ of sleeping sickness, as the tsetse-fly known as *Glossina palpalis* does not exist in the protectorate of Nyasaland (although it is found on Lakes Tanganyika and Mweru). More than one expedition is now at work investigating these interesting questions, and especially as regards the connection between tsetse-fly and big game. Whatever the results obtained by these expeditions may be, however, it is, I think, already evident that sleeping sickness will not prove to be such a scourge in these parts as it has been in Uganda.

It has been believed by many that the presence of game, and especially buffalo, is responsible for the existence of tsetse-fly. After many years spent in travelling over every part of Nyasaland and much of northern Rhodesia, Portuguese and German East Africa, and the Upper Congo, I arrived at the conclusion that the weight of evidence is against this theory, so far as tropical Africa is concerned; and in this belief, namely, that *tsetse in these regions does not depend on big game for its existence*, I think that all who are entitled to speak with authority, including Mr. Selous, are now agreed.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE annual prize distribution and students' conversazione of the Northampton Polytechnic Institute, Clerkenwell, E.C., will be held to-morrow, December 8. Sir William H. White, K.C.B., F.R.S., will distribute the prizes and certificates.

THE organising committee for the Imperial University Congress to be held in London next July has appointed Dr. Alexander Hill, formerly Master of Downing College, Cambridge, to be secretary to the congress, in succession to the late Dr. R. D. Roberts.

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A study of the calendar for the session 1911–12 of the University College of North Wales emphasises how much has been accomplished in recent years in making more easily available the advantages of higher education. It can no longer be said that university education is possible only for the child of wealthy parents. The present calendar shows that the fees of an ordinary arts student at the University College of Bangor amount only to 13*l.* 1*s.* per session, and of a science student to 17*l.* 1*s.* per session. The total cost of living in lodgings and tuition in Bangor averages from 35*l.* to 45*l.* for the session.

The annual meeting of the trustees of the Carnegie Foundation for the Advancement of Teaching was held in New York on November 17. According to a Press notice, says *Science*, Mr. Carnegie gave 200,000*l.* of the 1,000,000*l.* which he had promised in case the State-supported institutions were admitted to the benefits of the foundation. The endowment is 2,425,200*l.*, yielding an annual income of 118,000*l.* Last year, it is said, the sum of 105,200*l.* was paid for pensions to 370 professors and widows of professors. Forty-eight were added to the list for the year, and fifteen died. The University of Virginia was added to the list of accepted institutions.

The fourth annual dinner of the old students of the Royal College of Science, London, will be held at the new Imperial College Union, Prince Consort Road, South Kensington, on Wednesday, December 13. Sir Alexander Pedler, F.R.S., president of the Old Students Association, will preside; and the guests will include the President of the Board of Education, the Rt. Hon. A. H. D. Acland, Sir Robert Morant, K.C.B., Sir Arthur Church, K.C.V.O., Sir Alfred Keogh, K.C.B., Prof. S. H. Cox, and Prof. W. E. Dalby. Tickets for the dinner may be obtained on application to the secretary of the Old Students Association, 3 Selwood Place, S.W.

It was proposed recently that steps should be taken to establish a University of Brighton, and a meeting is to be held on Tuesday next, December 12, by invitation of the Mayor of the town, to consider the subject. It is suggested that there might be affiliation with the Municipal College at Portsmouth and the Hartley University College, Southampton, to constitute a new university for the South Coast, or that the present radius of the University of London should be extended to include the proposed new University College. Hitherto, Brighton has not shown any very marked desire to take a prominent part in technical or university education. The town has a population of 131,000, yet there are only between sixty and seventy day students in the Municipal Technical College, and nearly two-thirds of these are first-year students. This does not provide a very promising nucleus upon which to constitute a university or a university college, or indicate keen local interest in higher education. We should be sorry, however, to discourage the proposal, and we trust that next Tuesday's meeting will lead to the formation of a scheme which will be successfully carried out in due course.

The report of the council of the Royal Agricultural Society, adopted at the annual general meeting held yesterday, contains, among other interesting particulars, information concerning certain alterations in the regulations and syllabuses of the society's examination in agriculture. The National Agricultural Examination Board is of opinion that the time has arrived when the practice of examining in elementary science might be discontinued, and the subjects of examination will in future be:—practical agriculture (two papers), farm and estate engineering (including surveying, buildings, machinery, and implements), agricultural chemistry, agricultural botany, agricultural book-keeping, agricultural zoology, and veterinary science. Candidates will have the option of taking the whole eight papers in one year, or of sitting for a group of any four in one year, and the remaining group of four in the next year. In order to be eligible to sit for the new examination, a candidate must present a certificate from a recognised agricultural college that his attainments in the subjects of general botany, general chemistry, geology, and physics and mechanics, as attested by class and other examinations, are, in the opinion of the authorities of the college, such as to justify his admission to the examination.

So much attention has been directed during the year to the question of the legitimate place of public examinations in our system of education that a special interest is attached to an unsigned article in the Journal of the Royal Society of Arts of November 10 on the number of candidates offering themselves for the public examinations held during the year 1910. It appears that some 300,000 pupils were examined, without counting students presenting themselves for university and professional examinations and all the competitive examinations for the Army, Home and Indian Civil Services, and so on. This very large total included about 23,000 candidates in each case for the Local examinations held by the Universities of Oxford and Cambridge, some 6000 for the London Matriculation examinations, about 113,500 for the science and art examinations of the Board of Education, 24,500 for the technological examinations of the City and Guilds of London Institute, 11,500 for the London Chamber of Commerce examinations, 9000 for those of the College of Preceptors, about 14,500 for those of the National Union of Teachers, 42,000 for the examinations of the Lancashire and Cheshire Union of Institutes, and more than 27,000 for those of the Royal Society of Arts. As the writer of the article remarks: "Most people will admit that, whether examinations are or are not desirable, the thing is somewhat overdone."

SOCIETIES AND ACADEMIES.

London.

Royal Society, November 23.—Sir Archibald Geikie, K.C.B., president, in the chair.—Sir Norman **Lockyer**: The iron flame spectrum and those of sun-spots and lower-type stars. Previous publications are referred to indicating that the spectral lines of the metallic elements have been separated into two series, one seen best in the hotter stars and when high temperature and great electric energy are employed. These were termed "enhanced lines." The other set, existing in stars of the solar type, but not in high-temperature stars, and seen with lower degrees of heat and electric energy in the laboratory, were called "arc lines." These lines have been shown to be strengthened in sun-spot spectra, while the enhanced lines are weakened. It seemed important to consider as a third term the spectrum given by the comparatively low temperature of the oxyhydrogen flame and see how the lines in the spectrum behave in the spectra of sun-spots and lower-type stars. Photographs have been recently obtained of the oxyhydrogen flame spectrum of iron, using greater dispersion than has hitherto been employed on that spectrum at Kensington. It has been found that the lines existing in the flame spectrum nearly all behave in a similar way in sun-spot spectra, these lines being extensively winged in passing from the Fraunhoferic spectrum to the sun-spot spectrum, and, generally speaking, more conspicuous in the latter. It has also been found that the flame lines are just those which are relatively strong in the electric furnace spectra of iron, the spectrum furnished by the lowest temperature conditions dealt with in the furnace being almost identical with the oxyhydrogen flame spectrum. With regard to the behaviour of the flame lines in the spectra of lower-type stars, it is found that in the region λ 4000 to λ 4330 they are mainly unaffected in the spectrum of Arcturus. In the region λ 4330 to λ 4500 the evidence tends to show that most of the lines are strengthened both in Arcturus and α Orionis, but this point cannot be definitely established until stellar spectra of greater dispersion are available.—Sir Robert **Hadfield**: Sinhalese iron of ancient origin. There being little definite evidence regarding ancient iron, the author describes some specimens from the buried cities of Ceylon. His paper supplements one by Dr. G. Pearson, read to the society in 1795, on Indian steel of modern manufacture. The specimens investigated, obtained through the kindness of the Governor-General of Ceylon, Sir Henry McCallum, are (1) a steel chisel, fifth century A.D.; (2) an ancient nail, probably of same place and date; (3) a bill

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